

**NEUTRAXX**

**REWIND AND FORWARD**

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**Negamax**  
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# TWEET



# #NGINX #DEVOPSDUBLIN

2014  
TOP 1 MILLION WEBSITES

37.0%

TOP 1000 WEBSITES

**Nginx**

**JUST A WEB SERVER?**

# NO!

Nginx (pronounced "engine x") created by Igor Sysoev in 2002  
Application accelerator

- » Reverse proxy
- » HTTP/HTTPS
- » SMTP/POP3/IMAP
- » TCP (> 1.9.0 --with-stream)/UDP ( > 1.9.13 )
- » Load balancer
- » Caching

# LOCATION

# BASICS?

```
location /awesome {  
    try_files $uri $uri/ index.html;  
}
```

```
location ~ /awesome {  
    try_files $uri $uri/ index.html;  
}
```

# UPSTREAM

# REQUEST RETRY ON ERROR

## OPEN SOURCE AND PLUS

```
upstream mybackend {  
    server 10.0.0.1:80;  
    server 10.0.0.2:80;  
}  
  
server {  
    proxy_next_upstream error timeout http_500 http_502 http_503 http_504 non_idempotent;  
    proxy_pass http://mybackend;  
}
```

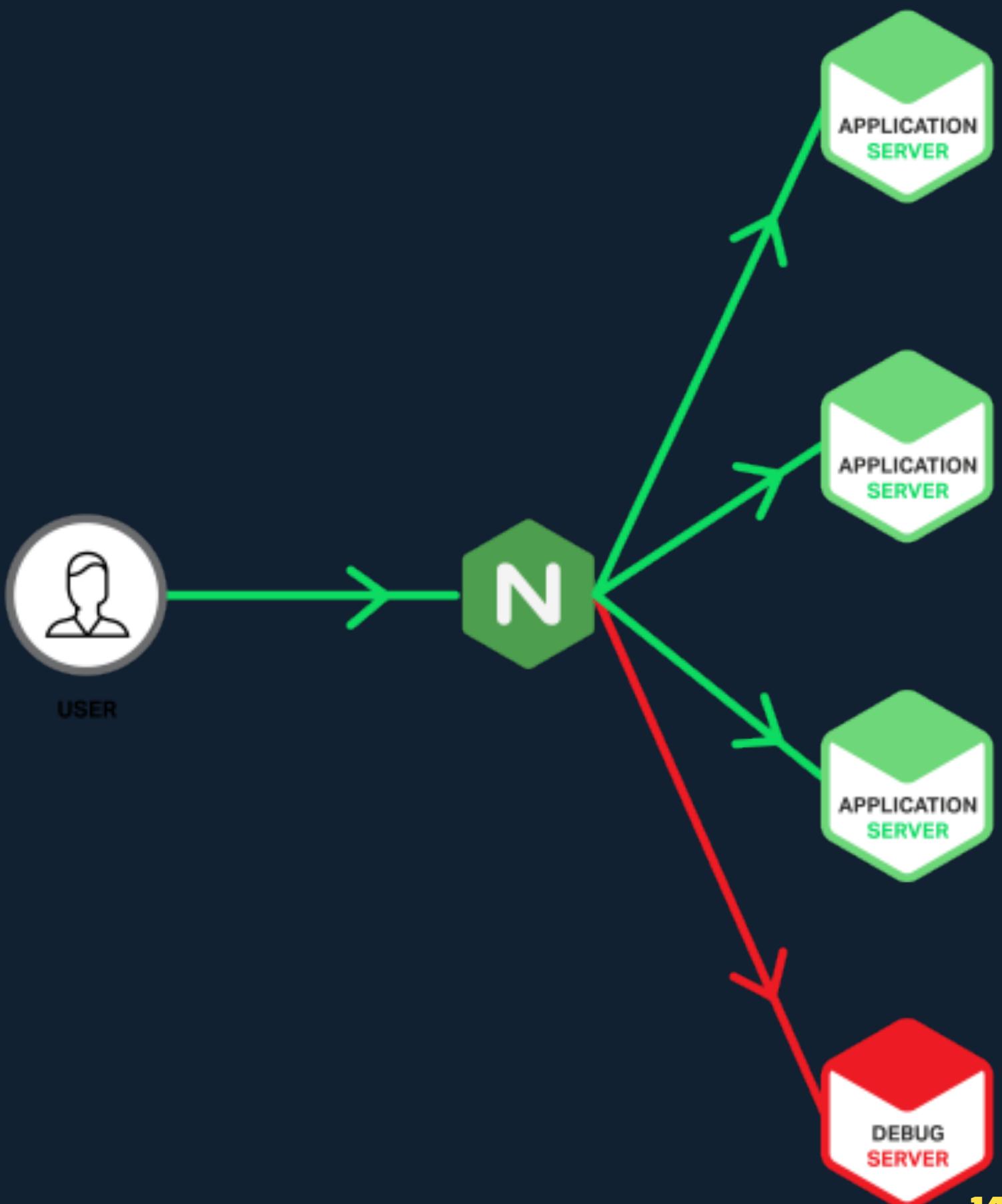
» non\_idempotent > 1.9.13

# ADVANCED BACKEND RETRY

```
upstream mybackend {  
    server 192.168.0.1;  
    server 192.168.0.2;  
}  
  
server {  
    location / {  
        error_page 502 504 @fallback;  
        proxy_pass http://mybackend;  
        proxy_next_upstream off;  
    }  
  
    location @fallback {  
        proxy_pass http://mybackend;  
        proxy_next_upstream off;  
    }  
}
```

# DEBUG SERVER OPEN SOURCE AND PLUS

```
upstream app_server {
    server 172.16.0.1 max_fails=1 fail_timeout=10;
    server 172.16.0.2 max_fails=1 fail_timeout=10;
}
upstream debug_server {
    server 172.16.0.9 max_fails=1 fail_timeout=30 max_conns=20;
}
server {
    listen *:80;
    location / {
        proxy_pass http://app_server;
        proxy_intercept_errors on;
        error_page 500 503 504 @debug;
    }
    location @debug {
        proxy_pass http://debug_server;
        access_log /var/log/nginx/access_debug_server.log detailed;
        error_log /var/log/nginx/error_debug_server.log;
    }
}
```



# UPSTREAM KEEPALIVE

## OPEN SOURCE AND PLUS

```
upstream keepalive-upstream {  
    server 127.0.0.1:8001;  
    keepalive 32;  
}  
  
server {  
    location / {  
        proxy_pass http://keepalive-upstream;  
        proxy_http_version 1.1;  
        proxy_set_header Connection "";  
    }  
}
```

# SERVICE DISCOVERY PLUS ONLY

» consul

» etcd

» zookeeper

```
resolver 127.0.0.1;
upstream consul-service {
    server service.dc1.consul service=voice resolve;
}
```

# DYNAMIC UPSTREAM

## PLUS ONLY

```
upstream backend {  
    zone backend 64k;  
    state /etc/nginx/conf.d/backend.state;  
}  
  
location /upstream_conf {  
    upstream_conf;  
}
```

# NODE DRAINING

## PLUS ONLY

```
$ curl http://localhost/upstream_conf?upstream=backend  
server 192.168.56.101:80; # id=0  
server 192.168.56.102:80; # id=1  
server 192.168.56.103:80; # id=2  
$ curl http://localhost/upstream_conf?upstream=backend\&id=1\&drain=1  
server 192.168.56.102:80; # id=1 draining
```

# SPLIT\_CLIENTS

# EPHEMERAL PORT LIMIT

## OPEN SOURCE AND PLUS

```
upstream backend {
    server 10.0.0.100:1234;
    server 10.0.0.101:1234;
}

server {
    location / {
        proxy_pass http://backend;
        proxy_bind $split_ip;
        proxy_set_header X-Forwarded-For $remote_addr;
    }
}

split_clients "$remote_addr$remote_port" $split_ip {
    35% 10.0.0.210;
    35% 10.0.0.211;
    *     10.0.0.212;
}
```

# MULTIPLE DISK CACHING

## OPEN SOURCE AND PLUS

```
split_clients $request_uri $cache {  
    50%      disk1;  
    *        disk2;  
}  
  
proxy_cache_path /mnt/disk1/cache keys_zone=disk1:100m levels=1:2 inactive=600s max_size=5G use_temp_path=off;  
proxy_cache_path /mnt/disk2/cache keys_zone=disk2:100m levels=1:2 inactive=600s max_size=5G use_temp_path=off;  
server {  
    listen localhost:80;  
    proxy_cache $cache;  
    location / {  
        proxy_http_version 1.1;  
        proxy_set_header Connection "";  
        proxy_pass http://upstreams;  
    }  
}
```

**MAP**

**PROXY\_CACHE\_BYPASS**

# CACHE "PURGE" OPEN SOURCE AND PLUS

```
location / {  
    add_header X-Cached $upstream_cache_status;  
    proxy_cache_bypass $http_cache_purge;  
    proxy_pass http://mybackend;  
}
```

```
root@server:~# curl --header 'Cache-Purge: 1' http://myserver/url/topurge
```

# 0 BYTE CACHING OPEN SOURCE AND PLUS

```
map $upstream_http_content_length $flag_cache_empty {  
    default          0;  
    0                1;  
}  
  
server {  
    location / {  
        proxy_no_cache $flag_cache_empty;  
        proxy_cache_bypass $flag_cache_empty;  
    }  
}
```

# CACHE DISABLE BASED ON COOKIES

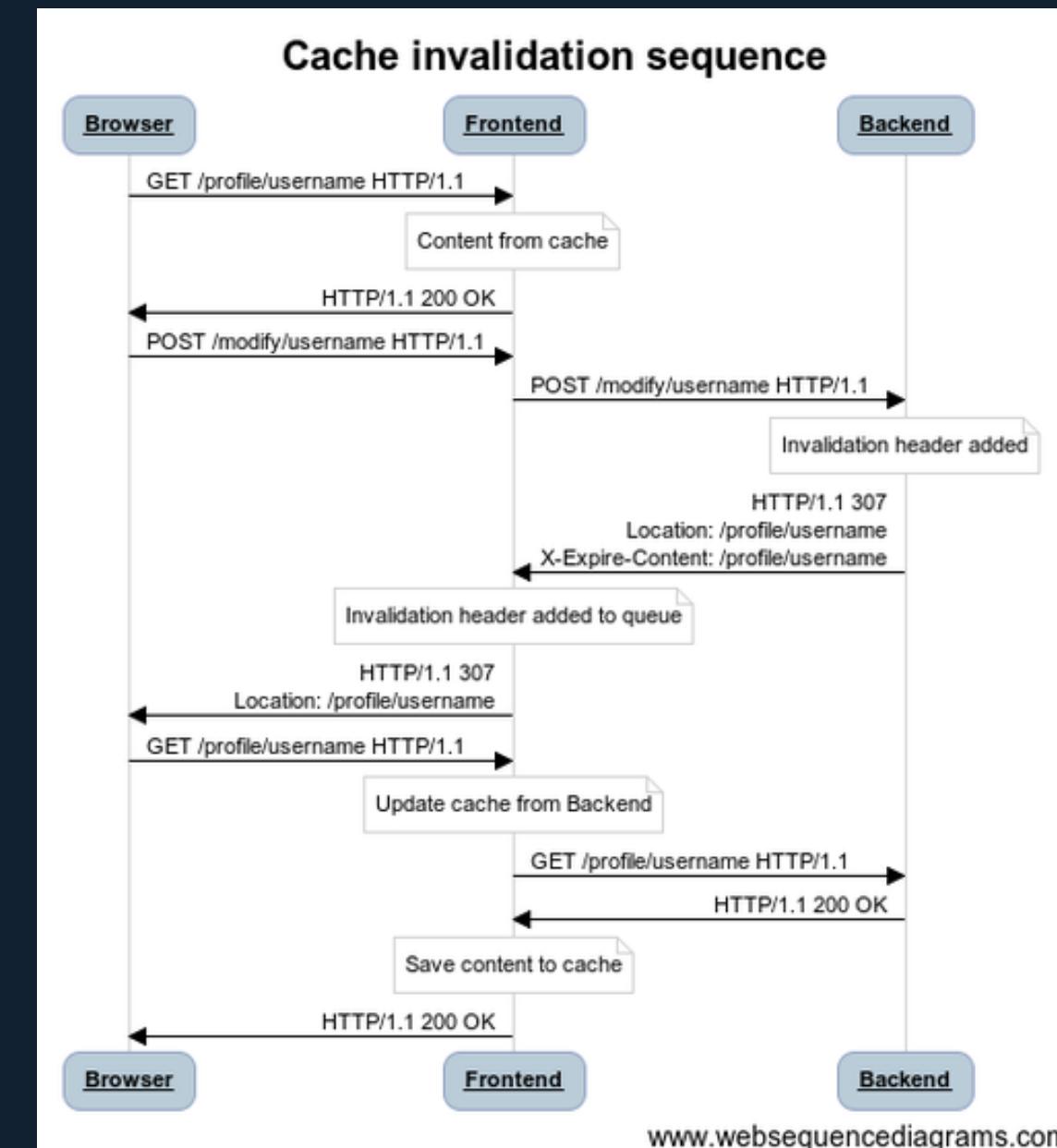
## OPEN SOURCE AND PLUS

```
map $http_cookie $no_cache {  
    default 0;  
    ~ASPXAUTH 1;  
}  
  
location / {  
    proxy_cache_bypass $no_cache;  
    proxy_pass http://mybackend;  
}
```



# PASSIVE CACHE INVALIDATION

## OPEN SOURCE AND PLUS - REQUIRES LUA



# DYNAMIC SSL CONFIGURATION

## OPEN SOURCE AND PLUS - REQUIRES LUA MODULE

- » AWS KMS Integration
- » Let's Encrypt integration

```
ssl_certificate_by_lua '...';  
ssl_certificate_by_lua_file lua/script.lua;
```

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# 0 DOWNTIME DEPLOYMENT

```
upstream zerodowntime {
    server 127.0.1.1:64;
    server 127.0.1.1:65;
    server 127.0.1.1:66;
}

server {
    listen 80 backlog=4096 default;
    server_name _;

    access_log /var/log/nginx/access.log;
    error_log /var/log/nginx/error.log;
}

location / {
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header Host $host;
}
```

# DEPLOYMENT

Transactions:	32758 hits
Availability:	100.00 %
Elapsed time:	170.76 secs
Data transferred:	0.28 MB
Response time:	0.02 secs
Transaction rate:	191.84 trans/sec
Throughput:	0.00 MB/sec
Concurrency:	2.91
Successful transactions:	32758
Failed transactions:	0
Longest transaction:	0.42
Shortest transaction:	0.00

FILE: /usr/local/var/siege.log

You can disable this warning by editing  
the .siegerc file in your home directory; change  
the line `allow_insecure_email = 0` to `allow_insecure_email = 1`.

# 0 DOWNTIME DEPLOYMENT

## OPEN SOURCE AND PLUS

```
upstream zerodowntime {  
    server localhost:8001;  
    server localhost:8002 backup;  
}
```

» OSE

```
sed -i "s/\ backup//g" /etc/nginx/conf.d/upstream.conf  
sed -i "s/:8001/:8001 backup/g" /etc/nginx/conf.d/upstream.conf  
kill -HUP $(cat /var/run/nginx.pid)
```

» Plus API

# EXECUTABLE UPGRADE ON THE FLY OPEN SOURCE AND PLUS

```
root@myserver:~/usr/bin# cp new.nginx nginx
root@myserver:~/usr/bin# pkill -USR2 nginx
root@myserver:~/usr/bin# kill -s WINCH `cat /run/nginx.pid.oldbin`
COMMIT:
root@myserver:~/usr/bin# kill -s QUIT `cat /run/nginx.pid.oldbin`
ROLLBACK:
root@myserver:~/usr/bin# kill -s HUP `cat /run/nginx.pid.oldbin`
root@myserver:~/usr/bin# kill -s QUIT `cat /run/nginx.pid`
```



**WOW!**  
**SUCH** **CHANGINX**  
**MUCH INFORMATION**

**MOAR INFORMATION  
[HTTP://SYSHERO.ORG/](http://SYSHERO.ORG/)  
THANKS! QUESTIONS?**

# ADVANTAGES/WHY PLUS

- » Support, have I said support? yes, support!
- » Load balancing methods (e.g: leasttime connect, firstbyte, last\_byte)
- » Consistent hashing
- » Health checking
- » Backend connection limit
- » UDP load balacing
- » Cache performance improvement
- » Retrying of non-idempotent requests

# ADVANTAGES/WHY PLUS

- » Dynamic upstream reconfiguration (http API/dns)
- » Dynamic virtual host reconfiguration (http API)
- » Service discovery (etcd/consul/zookeeper)
- » Cache Purge
- » Better monitoring and metrics
- » Dashboard
- » nginxScript?

# DASHBOARD PLUS

The screenshot displays the NGINX+ Dashboard Plus interface, which provides a comprehensive overview of the system's performance and configuration. The top navigation bar includes links for Dashboard, Server zones (green checkmark), Upstreams (red X), TCP Zones (green checkmark), TCP Upstreams (green checkmark), Caches (yellow exclamation mark), and a gear icon for settings.

**Version:** 1.9.4

**Address:** 127.0.0.1

**PID:** 11378

**Uptime:** 6h 56m

**Connections:** Accepted: 750748

Current	Accepted/s	Active	Idle	Dropped	Current	Req/s
39	36	10	29	0	10	61

**Requests:** Total: 1033866

**Server zones:** ✓ Total: 3 / Problems: 0

**Traffic:** In: 20.0 KiB/s Out: 248 KiB/s

**Upstreams:** ✗ Total: 2 / Problems: 2

**Servers:** All: 11 / Up: 6 Failed: 4

**TCP Zones:** ✓ Conn total: 72293 Conn current: 0 Conn/s: 0

**Traffic:** In: 0 Out: 0

**TCP Upstreams:** ✓ Total: 1 / Problems: 0

**Servers:** All: 4 / Up: 3 Failed: 0

**Caches:** ! Total: 2 / Problems: 1

**Caches states:** Warm: 2 Cold: 0

**SO FANCY  
MUCH EXAMPLES  
WOW**

# **ANOMALY DETECTION AND RATE LIMITING**

## **OPEN SOURCE AND PLUS - REQUIRES LUA MODULE, SOME SCRIPTING AND EXTERNAL TOOLS**

<https://github.com/openresty/lua-resty-limit-traffic>

- » Individual metric collection (URI, URI, Account, Type, Verb, ...)
- » Anomaly detection (Datadog, Morgoth)
- » Cached/Uncached requests
- » Response time
- » Anonymous/Authenticated requests